European Academy of Management (EURAM)

14th Annual Conference – 4-7 June 2014 – Valencia Spain

Stimulating industrial ecosystems with sociotechnical imaginaries:

The case of Renault Innovation Community

Sophie HOOGE
Center for Management Science
Mines ParisTech
sophie.hooge@mines-paristech.fr
Corresponding author

Laura LE DU
Center for Management Science
Mines ParisTech
laura.le_du@mines-paristech.fr

Abstract

Facing the necessity to increase their innovation capabilities in a more and more holistic context, companies are creating new collaborative organizations aiming to collectively explore potential radical innovation fields. In this paper, we propose to study the nature of these new collectives for innovation through two managerial patterns: objects of collaboration and organizational mechanisms of coordination. Based on longitudinal collaborative research with the French carmaker Renault, the research analyses the case of the Renault Innovation Community, which involved members in original collaboration features to stimulate the industrial ecosystem of mobility and to support the potential emergence of new ecosystems.
The main results of the empirical research underlined that: (1) objects of collaboration surpassed the detection of societal expectations to focus on sociotechnical imaginaries stimulation and dissemination; and (2) organizational mechanisms of collaboration exceed open innovation logics to focus on the collective building of favorable emergence conditions for new industrial ecosystems.

Keywords: sociotechnical imaginaries, industrial ecosystem, innovation community

Stimulating industrial ecosystems with sociotechnical imaginaries: The case of Renault Innovation Community

Abstract

Facing the necessity to increase their innovation capabilities in a more and more holistic context, companies are creating new collaborative organizations aiming to collectively explore potential radical innovation fields. In this paper, we propose to study the nature of these new collectives for innovation through two managerial patterns: objects of collaboration and organizational mechanisms of coordination. Based on longitudinal collaborative research with the French carmaker Renault, the research analyses the case of the Renault Innovation Community, which involved members in original collaboration features to stimulate the industrial ecosystem of mobility and to support the potential emergence of new ecosystems.

The main results of the empirical research underlined that: (1) objects of collaboration surpassed the detection of societal expectations to focus on sociotechnical imaginaries stimulation and dissemination; and (2) organizational mechanisms of collaboration exceed open innovation logics to focus on the collective building of favorable emergence conditions for new industrial ecosystems.

Keywords: innovation, sociotechnical imaginaries, industrial ecosystem, innovation community

Stimulating industrial ecosystems with sociotechnical imaginaries:

The case of Renault Innovation Community

Due to shorter and shorter cycles of products renewal, the ability of companies to develop innovative strategies to guide novel and varied developments of technologies and usages of their products becomes crucial to maintain and develop a competitive advantage (O'Connor, 2008). To do this, firms must be able to create emulation around various fields of potential innovation that support a conceptual effort both on the development of new technological concepts than tracks of original customers' uses of firm's goods (Le Masson, Weil, & Hatchuel, 2010). To induce industrial dynamics, this effort must be conducted both inside the company and relying on the cognitive resources of partners, potential stakeholders of future industrial ecosystems that will develop new products or services (Adner, 2006; Teece, 2007). Two managerial logics of collaborative organizations are possible to stimulate innovation in industrial ecosystems. On the one hand, the firm could manage the interactions within the ecosystem as a focal firm (R. Adner & Kapoor, 2010; Iansiti & Levien, 2004) and steers the emulation on some signals that the firm has caught and pre-interpreted. Then, the company select suppliers and business network with undertaking partnerships in order to organize a collective response to the customer requirements that the firm has decided to address (van Lente, 2012). This first strategy is largely at the heart of open innovation initiatives managed by a leader firm (H. W. Chesbrough, 2003). On the other hand, the firm could look for an emulation focused on the design of collective interests for innovation. In this second strategy, the aim of the collaborative organization becomes to build an area for the design of common purpose for innovation-driven partnerships (Segrestin, 2005). Our research addresses the research gap to distinguish these two strategies of ecosystem-based collaborations for innovation. We focus on the second kind of organizational constructions that are in-between

more established forms of organizations, looking for more in-depth understanding of their operations — objects of the collaboration and organizational mechanisms of coordination — and their impacts on the innovation management in established firms.

To support such collaboration, the firm has to manage the emulation at the level of the "sociotechnical imaginaries" that could induce new areas for major innovation, by the creation of group integrating a wide network of people with different skills and business approaches in order to organize a collective exploration of new technical objects and emergent uses of goods. Linking the notion with the scholars' sociologic work on expectations, Pickersgill (2011) defines sociotechnical imaginaries as " *one means through which anticipatory discourse and practices are structured, and thus as a mechanism through which futures are designed* " (2011:28). Indeed, sociotechnical imaginaries differ from expectations because they are created, manipulated and managed directly by individuals. More precisely, the "sociotechnical imaginaries of a group of designers" has been defined as the shared cognitive framework, including collectively imagined forms of social life and social order — as value representations, institutions and regulations requirements, and symbols — reflected in the design and fulfillment of group-specific scientific and/or technological projects (Jasanoff & Kim, 2009; Strauss, 2006). Consequently, in this strategy for ecosystem emulation, the firm must stimulate jointly inventors and creative networks that used to elicit theirs imaginaries and to manipulate an enough abundant variety of images and/or conceptual formulation to describe the potential of new technologies, new products and their uses. Consequently, our research addresses the hypothesis that stimulating sociotechnical imaginaries can be an effective mean to promote the projection of new organizations for disruptive innovations market, *i.e.* new industrial ecosystems.

Although the interest of such approach seems obvious for industrials, the implementation of such emulation remains unclear. The process of identification and selection of concepts,

which drive the exploration, has few management tools and methods to manage this collective activity. Similarly, the resource that may constitute the collective activity dedicated to anticipation - business intelligence, technological forecasting, prospective - is to clarify: could they generate collective exploration of new concepts? What types of deliverables can they provide to emerging industrial ecosystems? And how to manage this collaboration? This paper fits into this knowledge gap and proposes to investigate through a case study the experience of an industrial group which, in its practices, is ahead of societal trends by creating and stimulating new sociotechnical imaginaries within an cross-industrial ecosystem.

Inside the company, willingness to be proactive about the imaginary constitution of uses and technologies, examines the role of R&D departments. If companies want to act on societal changes, the object is no longer to be able to learn about which will make potentially tomorrow's markets, as absorptive capacity field suggests (Cohen & Levinthal, 1990), but to stimulate industrial ecosystem where, economic actors collectively generate innovative and coherent proposals, able to support the generation of new markets. According to this assumption, what organizational devices can enable and support these collective actions? How R&D departments can become players involved in these efforts?

The paper focuses on two research issues on the nature of collective exploration that will be at the heart of this case study: **1 / what are the objects of exploration?** If the actors are no longer working on a specific application, if there are no more functional specifications to guide collective action, on what objects is working the collective? On road map, demonstrators, scenarios of potential applications, usages and businesses? Once determined the nature of these objects, what tools and methods to generate and pass them around players in the ecosystem? How to support a collective action more generative of variety and technical imaginaries, which could carry on a competitive pre-positioning, based on original

sociotechnical imaginaries? **2 / what are the organizational mechanisms of coordination of the collectives that appear?** Who gather the players? What types of organizations are they adopting? Who will drive the group? What are their interactions with R&D departments, suppliers or users? Do they include partners from outside industry and/or the current market? How do they divide the work among stakeholders?

In this paper, we propose to study the nature of new collectives for innovation through these two specific managerial patterns: objects of collaboration and organizational mechanisms of coordination. The research relies on an original material from a collaborative longitudinal study with the Renault Innovation Community, the innovation-based think tank of the French car manufacturer, that gather representatives from various industrial sectors, institutions and disciplines. In a first section, we discuss former proposals of scholars on the management of the two managerial patterns for collective exploration of new markets creation. In the second section, we present how we conduct the case study and analyzed the data from the collaborative research partnership. Then, we develop the case study analysis (section 3) detailing the results and managerial implications, then we discuss the impacts of the collaborative organization on the ecosystem and innovation management (section 4) and finally, section 5 concludes the paper and propose further research.

1. Theoretical framework on collective exploration for new markets creation: objects of collaboration and organizational mechanisms

1.1/ Objects of collaboration for ecosystem emulation: from expectations detection to stimulation of sociotechnical imaginaries

In line with work on foresight approach, building of corporate strategy is traditionally based on the identification and modeling of societal, environmental and technological trends

proposed by the strategic unit of foresight (*e.g.* (Godet, 2000)). Based on a management approach of anticipating changes in customer and market, contemporary studies on societal expectations are now the subject of a theoretical modeling nurtured in the international scientific literature (*e.g.* (Gordon, Glenn, & Jakil, 2005; van Lente, 2012)), which is beyond the scope of foresight. Anticipatory vision developed by this literature structures collective action and collective organizations around this objective of common response to exogenous expectation. Two main approaches have been developed: the first, sociological, relies on the assumption of a collective cohesion made possible by the superposition of anticipatory visions of several companies (van Lente, 2012); while the second, more rationalist, is part of a decision-making paradigm where the object is to reduce uncertainties about the possible variations of the commercial future of a company by developing the most accurate modeling of potential alternatives related to each project and associated investments (R. Adner & Levinthal, 2004; Fredberg, 2007).

The effectiveness of both approaches — by societal expectations or by expected profitable investments — turns out to be limited by the knowledge on existing markets, and thus the management of the renewal of former products or of the reaction to competitive fallbacks. It appears inadequate when it comes out of the conventional ways of developing new products since it enhances the fixation effects within collectives due to previous technical choices of designers (Kaplan & Tripsas, 2008; Thrane, Blaabjerg, & Møller, 2010). Indeed, if we go into details of tools for foresight or uncertain investments, the most used method - the scenarios method - is based on the meta-descriptive modeling of exogenous characters of the company (cost of raw materials, laws, etc.) and the study of contrasting developments of these characters to describe the possible states of a market at a distant term (Coates, 2000; Schnaars, 1987). To do it, foresigthers and economists use specific objects to collaborate: they

build scenario on confirmed societal trends and signals (as for example, household composition, purchasing power of targeted customers, availability of resources, *etc.*). These specific objects of collaboration have a status strongly distanced to functional or technical description of the products developed by the firm, that allows a high degree of generalization but decreases the ability of designers to embed it in their works. Thus, scenarios turn out to be powerful management tools to guide the search of concept and investigations of knowledge but appear insufficient to support a social imaginaries conjunction with technical imagination. Moreover, the scenario technique involves the development of a proactive and naturalizing strategy relying on the stability of the dominant design model (Abernathy & Utterback, 1978). For example, prospective scenarios disseminated in the automotive industry highlight the strengths and weaknesses of existing design resources in case of changes in multiple exogenous factors: oil prices, legislation, geo-political context, the purchasing power of households, *etc*. They are therefore useful in helping the company to pre-position itself against a set of variations considered as probable (Lichtenthaler, 2004) but with a strong assumption: it supposes the technical, functional and commercial stability of product and automotive industrial ecosystem. This approach is consequently heavily defensive and seems ill suited to markets where competition concerns the very identity of objects and specific characteristics of differentiation. Indeed, it does not support the firm to develop proactive strategy that generates new spaces of value. Focusing in designing a new industrial ecosystem for innovation (Adner, 2006; Iansiti & Levien, 2004; Moore, 2006) and thus creating new markets, the organization of a repeated and sustained innovation process arises the issue of adapted objects for strong interactions between actors. These objects of collaboration aim generating new societal expectations or new imaginative concepts (Le Masson, Weil, & Hatchuel, 2009), and thus amplify the stimulating nature of some concepts at the level of the company itself, but also for all an emerging industrial ecosystem. Consequently, these objects

have to support conjunctions of social imaginaries with technical imagination.

Nevertheless, objects of collaboration relying on joint changes of social imaginaries and technical imagination are under investigated, mostly because imaginaries used to be seen as largely shared and stable across a society, slowly renewed through scientific progress (Durand, 1993). Nevertheless, Jasanoff and Kim (2009), who defined sociotechnical imaginaries as "*collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects*" (2009: 120), have underlined that some non-scientific actors — institutional actors in their research — could play an important role in interaction with scientists and technologists on the societal dissemination and evolutions of sociotechnical imaginaries. Even if sociotechnical imaginaries had been investigated in a few industrial context (*e.g.* (Brayton, 2013; Felt, 2013; Jasanoff & Kim, 2009; Pickersgill, 2011)), a lack of knowledge remains on the interaction between social group and industrial communities, that could efficiently drive this scientific progress through a coordinate R&D effort. Despite philosophers have highlighted the impacts of imaginaries on science and collective coordination — as Gaston Bachelard have underlined that imagination may limit or challenge the individual capacity in the building of scientific models (Chimisso, 2001), or as Cornelius Castoriadis have claimed that social groups are at the origin and in charge of the evolution of their imaginaries (Castoriadis, 1987) —, their impact as effective drivers for the emergence of new industrial ecosystems is still an open issue for innovation management.

1.2/ Communities for innovation exploration: from **open innovation** *to the design of new industrial ecosystems*

Many studies focused on collaboration for major innovation and contemporary scientific community have developed two main approaches to these partnerships. On the one hand,

scholars study the collective action prior to commercial competition that rely on the knowledge about potential customers to develop innovative proposals. When there is collaboration between players, this approach is well known as *Open Innovation* since the works of H. W. Chesbrough (2003). On the other hand, researchers underlined new managerial roles of *innovation intermediaries*, specific to major innovation management (van Lente, Hekkert, Smits, & van Waveren, 2003): whether they are facilitators of the flow of knowledge in these new partnerships, they are called *Knowledge brokers* (Hargadon & Sutton, 1997; Howells, 2006); the *Innovation brokers* are in charge of linking actors scattered in different organizations (Klerkx & Leeuwis, 2009); the *Gatekeepers* translate external information in internal language understandable within the organization (Cohen & Levinthal, 1990); and the *Innovation capability builders* are in charge of the creation of organizational capability for innovation (Börjesson, Elmquist, & Hooge, 2014). As instructive as these approaches could be for the management of innovation-based collaborations, they are insufficient to describe collective exploration focused on new markets creation. First of all, these approaches assumed that collectives exist before the beginning of the exploration and players are supposed to have *a priori* a clear vision of their adjustments in the value chain of the innovation they are targeting, and thus, of their own strategic positioning. This view assumes that the company adopts a predatory logic towards the partnership in which its representatives are responsible for mobilizing the collective exploration as an economic leverage to better contribute to the individual performance of the firm. In this logic, the persistence of the partnership is not pursued or even explicitly rejected (H. Chesbrough & Crowther, 2006).

However, one can imagine a multi-actors exploration looking for new markets based on a collective that *a priori* does not exist but whose one or more firms would benefit of its

building. Common purpose to collaborate would be to develop a collective knowledge, i.e. with a shared property among all stakeholders (Segrestin, 2005), that could support the development of new industrial ecosystems. This collaborative approach is more similar to the historical meaning of the concept of community developed by Tönnies (Durkheim & Tönnies, 1889) where the value exists in the collective and through the collective, without that members can make a profit in isolation. Indeed, in a group aiming the exploration of the unknown markets, the issue of the division of work will focus more on the process of creating value for the ecosystem (Jacobides, Knudsen, & Augier, 2006), issues of cohesion within solidarity efforts in partnerships (Segrestin, 2005), the interdependence of specific assets of each actor and the possible prioritization around a common heart (Gawer, 2009). This approach by the collective-to-design is therefore linked to the management of knowledge as a process of coordination of collectives (Alavi & Leidner, 2001; Nonaka & Takeuchi, 1995) and the differences induced by the diversity of the groups' characteristics involved in the innovation communities: community of practice, epistemic and hierarchical communities (Cohendet & Llerena, 2003; Cowan, David, & Foray, 2000).

2. Methods and Research settings

This study relies on a longitudinal collaborative research (Shani & Coghlan, 2008) with the French car manufacturer Renault that linked researchers and industrial partners since 2005. Main method has been intervention research, gathering empirical data collection and action in the firm, with a continuous modeling work (Hatchuel & David, 2007; Radaelli, Guerci, Cirella, & Shani, 2012). The paper is based on the analysis of an industrial case (Yin, 2009) of an innovation-based community created by Renault, which brings together stakeholders from contrasting areas of science and industry and whose collaborative organization presents

managerial patterns that remain to highlight: the Renault Innovation Community (RI-Community). To understand how a mature firm like Renault initiates and develops original organizations to come through contemporary industrial challenges, a longitudinal case study analysis is a relevant methodology of research as it allows in-depth understanding of practices and a favored access to rich, reliable and comprehensive material.

2.1 Research context

Longitudinal analysis of an innovation community initiated by an historical player of the automotive industry is particularly suited to our work, as this sector requires the construction of one or more spaces of renewal of the sociotechnical imaginary about individual mobility. Indeed, we observe that the former stimulation devices of automotive imaginary — car racing, major international exhibitions, specialized presses — have now impoverished and current imaginaries around car mobility crystallize on contemporary difficulties of automobiles, such as energy consumption, pollution and health disorders. Nevertheless, new actors of the mobility that are not historical players of the automotive industry as Autolib, Toowup, ZipCar, *etc.*, multiplied attempts of regeneration of the sociotechnical imaginary of individual mobility. This paradox emphasizes the transition from the historic paradigm based on the ownership of an individual vehicle to a paradigm based on multimodal individual mobility (Firnkorn & Müller, 2012; Midler & Beaume, 2010), in which manufacturers are struggling to find a competitive place. Given the large and worldwide weakening of the automotive industry the last few years, managers of Renault are betting that historical manufacturers would benefit from an original collaborative approach both in the exploration of new technical imaginary for mobility design and in the stimulation of social imaginary linked to technologies and mobility uses, which would need to investigate other universes of design.

2.2 Data collection

The research is a qualitative study that combined theory building (Eisenhardt, 1989; Yin, 2009) and the production of actionable knowledge through collaborative research (Shani & Coghlan, 2008). As both authors are members of the RI-Community, numerous data has been collected during plenary sessions and projects meetings, especially as one of the authors has taken part of the initial building of the community in 2008. Data from intervention research methodology were triangulated (Flick, 2004) with semi-structured interviews, direct observation of RI-Community members' interactions during plenary sessions and RI-Community projects, and from Renault internal documents. Emerging theory and research hypothesis have been deepened through a master degree project dedicated to innovation community investigation between June and December 2012 (Tij, 2012). All in all, 18 plenary sessions have been investigated (three per year since 2008), one of the author took an active role in a cross-industry project of the RI-Community (Gillier, Hooge, & Piat, 2013) and 16 interviews dedicated to the study has been led with RI-Community members between June and October 2012 (Tij, 2012). For the theory building process (Eisenhardt & Graebner, 2007), we mobilized the analytical framework on communities proposed by Cohendet and Llerena (2003) in order to give a detailed characterization of the organizational features built by members of an innovation community, and to structure rigorously the observations.

2.3 Context of the case study: introduction of the Renault Innovation Community

The research focuses on the Renault Innovation Community (RI-Community), which is a cross-industries think tank on future patterns of mobility and innovation practices. This community is composed of representatives from highly various industrials sectors (automotive, aeronautics, railway, postal services, but also industries outside mobility markets as cosmetics, sports, energy, chemistry, pharmaceutics, ophthalmic lenses, and others.),

consultants, foresighters and academics from management, sociology, and philosophy. It is an original industrial-based community because members, mostly industrial top-managers and intellectuals from academy, are cross-industries and cross-disciplines people. Nevertheless, they share to be involved in the management of radical innovation and in strategic foresight on technological, environmental or societal evolutions. Since the first session in March 2008, the RI-Community grew from 70 members to more than an hundred at the end of 2013, with still around a third of members from Renault. They meet in quarterly plenary sessions of a full day animated by the deputy director of Renault in charge of the RI-Community and two dedicated community managers (one is a Renault employee, the other is independent consultant). These three facilitators of the RI-Community are in charge to plan original presentations and workshops for these sessions but also to animate inter-session workshops and support exchanges between members on the community website.

3. Case study analysis: the experience of Renault Innovation Community

As previously highlighted, the RI-Community has existed for several years and its membership base grows each year. From a managerial point of view, the collective organization appears as original both on its official topics for ecosystem innovation which are very broad (future patterns of mobility and innovation practices), but also by the large diversity of the individuals and industrial sectors that are involved in the collective. Nevertheless, its managerial patterns remain to highlight in order to understand the organization as an effective construction to stimulate innovation in industrial ecosystems. We propose here to develop two main patterns that emerged from the case study analysis: 1/ the objects of collaboration between members and more precisely, the gap between the objects expected by the initiators of the community and those really appeared in the collaboration; 2/ the organizational mechanisms of coordination they have developed together.

3.1 Objects of collaboration in the RI-Community

First of all, the managers in charge of RI-Community targeted specific objects of collaboration when they created the think tank. For Renault's managers and founding members involved at the beginning of the initiative, the aim of the community was the establishment of a collaborative process of exploration of future through an epistemic community on mobility evolutions, in the sense of Cohendet, Creplet, and Dupouet (2001). This specific goal aimed to increase the scope of Renault Innovation capability and those of firms' partners, through a collaborative approach of open innovation focused on mobility innovation. Renault's manager in charge of the community testified that it was the main goal pursued with the RI-Community but also the most ambitious and known as hard to reach collectively. Indeed, interviews led in 2012, fours years after the creation of the community, underlined the discomfort of members on this issue that they all had identified as crucial, but they also had the feeling to not succeed developing a common object of collaboration.

A second goal targeted was to propose the organizational resources to build an original network on potential disruptive innovations, beyond expected evolutions of mobility (more connected, more sustainable and so on). The aim was to favor the learning on original knowledge and then, its absorption in the diverse partner companies. Initiators of the RI-Community knew scholars' work on absorptive capacity and consequently, they expected to members to involve themselves as gatekeepers (Cohen & Levinthal, 1990). Operational project achievement was not targeted even if it could be outputs resulting from partnerships born in the community. To foster members in their gatekeeper role, initiators involved foresighters and consultants specialized in macroeconomics and strategy, in sharing theirs visions of potential societal changes with members. The initial process aimed to support the development of a common vision centered on the analysis of contrasting scenarios of population density, age demographics, and availability of energy and raw materials. Despite

this specific investment, members' interviews shown that Renault members were unable to cater for this managerial expectation due to the difficulties of interpretation and translation of the knowledge acquired in the community in their activities. Some of them tried by focusing on the transmission inside their own institution of the knowledge offered by speakers, but they mostly claimed failing to interest people in their firms. Moreover, consultants' presentations were considered as controversial and their insights strongly criticized as superficial, inconsistent or meaningless.

The sharing of best practices among members on radical innovation achievement was the third expected object of collaboration. This goal implicated that, the members from Renault had been chosen for their need or involvement in Renault strategic innovation activities. The sharing on innovation management practices was often mentioned by interviewees as really appreciate by members. This object of collaboration constitutes a best practice today well rooted within the community. Moreover, the RI-Community members recognized the group as a community of practice on major innovation in the sense of Cohendet, et al. (2001).

To summarize, managers expected that the RI-Community delivers a collaborative exploration of future by an epistemic community on original mobility evolutions, an absorptive capacity of members as gatekeepers on societal trends to increase the firms' innovation capability, and a community of practice on radical innovation methods and tools. Only the latter became an object of collaboration in practice, thanks to consistent efforts spanning overs multiple years.

From the longitudinal analysis of plenary sessions and projects led within the community, we could observe objects of collaboration that differ from those expected by managers.

First, it appeared that the members learnt on new mobility paradigm and on potential societal shifts more than on customers' expectations. For example on automotive individual mobility,

most presented customer's expectations were about reducing congestion and health disturbance, but members used to focus more the collective discussions on the shift of paradigm that occurs in ownership of cars (Midler & Beaume, 2010), and the consequences a move of business model could induce on private mobility uses. As members could propose innovative solutions together on the latter point, these debates had twofold results: they increased the sharing of a common understanding of the current mobility paradigm (one driver who is the car owner after a unique purchase) and its potential shifts; and the exploration of potential shifts became a common purpose for the RI-Community (Barnard, 1938; Segrestin, 2005).

Moreover, we also observe a better understanding of what could induce potential societal shifts, and how members could organize together the conditions to make them happened. For example, during one of the presentation in a plenary session, a representative of the Belgian chemical company Solvay brought an original and innovative exploration of future mobility with renewable energies through the "Solar impulse" concept. The presentation generated a rich debate of the action that each actor could play individually, collectively or as RI-Community in the achievement of the kind of new paradigm proposed by Solvay's representative. Besides, the 'impulse' concept has been immediately re-used by community members on another topic. This quick re-use of the concept demonstrated an unexpected and fast-acting collective capacity of appropriation and building on conceptual constructs..

Conceptual capability on ill-defined products or services is an unexpected collaborative object of the RI-Community, which members often pointed in interviews. This particular conceptual capability of the collective had been trained through an original method proposed by the RI-Community managers: the 'boxing' of on-going explorative or major innovation projects. The 'boxing sittings' exercise consisted to offer the opportunity to a member to present an idea or a disruptive concept that he or she was currently exploring during a plenary session and be

challenged by all members. More the concept exploration is at initial stages of investigation, more the exercise is enriching for each members. The community made this original exercise to try to identify the blurred concept with an unclear outline. For example, one member proposed a starting exploration of the concept of "users collaborative design of local mobility" trough a five minutes presentation of what he thought do with it. The members reacted by characterizing the project with new words, proposing new definitions, challenging it with new questions, enriching the initial concept with new concepts or other notions they had in mind, combining the proposal with other innovations, and at last by criticizing it weaknesses and giving provoking comments to continue to rise the debate. Finally, the concept had been chewed in several directions under-investigated by its owner but valuable for him and served as collaborative support for the members. Thus, when the community involved in 'boxing' a project given by a member, the efficiency of the conceptual description became the object of collaboration. To contribute to the collective enrichment, members had given numerous examples of original products or services but they also illustrated their point of view with rhetoric figures as metaphors or analogies, various references to literature, arts, and myths they associated to the mobility concept: thus, members shared and stimulated sociotechnical imaginaries. The repetition of such 'boxing' practices supported the increase of the RI-Community conceptual capability but also, contributed to the enrichment of the group's sociotechnical imaginary. 'Boxing sittings' were only one of the particular collaborative practices the RI-Community managers developed. Frequent subgroup workshops had supported the opportunity to share and test ideas or disruptive concepts in restrained groups. Innovative methods, intense networking and original forms of feedback to the whole community — as sketches, humoristic theater performance, *etc.* — led to a radical collective emulation on sociotechnical imaginaries. This is an important result of the RI-Community management as, despite members had reported a fail in the knowledge

transmission into the firms, they claimed about a large dissemination of original concepts in the different firms. So the social construction of the imaginaries was spread outside the community into members' firms.

To conclude, the observed objects of the collaboration were a better understanding of new mobility paradigms and its potential shifts, and subsequently a better comprehension of the role that members could play to make it happen; and a collective capability to appropriate and build on new concepts that efficiently supported the sharing of an enriched sociotechnical imaginary.

3.2 Organizational mechanisms of coordination of RI-Community

Governance rules of the RI-Community were original for a think tank funded by a single firm. Voluntarily, Renault rejected to be the "*focal firm*" of the community (Adner, 2006). Despite the fact the firm funds the logistics of the RI-Community, all members could benefit in the same way of the resources. This 'open resources' were a dedicated virtual platform on a website and two dedicated community managers. How they were the main initiators, Renault's managers used to fund plenary sessions logistic, but other members had hosted RI-Community sub-groups meetings and plenary sessions in their own premises. In the same approach, Renault managers did not want the firm impose its view to the RI-Community: they soon decided to always been less than 30 percent of the participants at plenary sessions. So, other companies have not the feeling that the representatives of Renault have crushed the debates. However, the community managers were playing a strategic role both structural and social in the balance of the community. They allowed the trust relationship between members and spread an open-mind spirit that facilitates the acceptance of original visions. The weight of Renault as initiator was also unquestionable: as all interviewees pointed, they gave to the community to work on mobility paradigm and make possible a "real open innovation" with

adapted collaborative patterns, especially supporting non-contractual collaborations. The intense networking that occurred between members reinforced the legitimacy of the community and the choice on governance rules. Interpersonal relationships appeared through the creation of new links between members of several companies but also with the strengthening links in the Renault's hierarchical community. Moreover, the original composition of members, surprisingly heterogeneous, enabled original partnerships on innovative projects between cross-industrial companies, engineering and design schools, consultants, and academics institutions.

Nevertheless, all members did not play the same role inside the community. Members classified themselves into four categories they elicited as based on the authority of people's opinion on the others: intellectual people, seniors and top managers, middle managers and consultants, and young people. Still from members' self-assessments, this classification could be crossed with another one they also gave, based on the diversity of involvement of participants in the debates of plenary sessions: organizing members, intellectual people, leading figures and occasional participants. These perceptions induced a kind of hierarchical double- scale between members themselves, resulting from a status — combining an authority of the opinion and the involvement — naturally given to each other between actors inside the community. Different sub-groups emerged inside the community, that converge more in sub-communities of practices according to the authority level of members; and more in epistemic sub-communities if we looked for the involvement criterion. Finally, this dual belonging appeared as an important mechanism of the community cohesion because members identified themselves through different categories according to their feeling of being able to understand and contribute to a sub-group. Practically, members involved themselves in sub-group that shared their language to explore ill-defined topics: in other words, they entered a group

because they understood the imaginary references manipulated by these particular members and could contribute to its improvement.

Finally, the Renault Innovation Community also supported the emergence of ephemeral partnerships between members to enable collective design of sub-elements prototypes of a renewed mobility. Inside these partnerships, a few members of the community designed prototypes in dedicated workshops between plenary sessions and then, regularly presented their advancement to all members. Subgroup partners involved the community through uses scenarios of the prototypes, in order that everyone from RI-Community could discuss the emergence conditions of the core concept of the project. For example, one of RI-Community project aimed to learn about “smart-grid intermodal hub”, that associates physical and virtual mobility devices to energy low consumption services. The project involved in a subgroup partnership the Parisian public transportation operator RATP, the energy producer and distributor EDF, the research team in innovative design management of MINES ParisTech and Renault. The exploratory team was composed of a representative of each industrial partner, two consultants in energy management, one of the RI-Community managers and a researcher. With the help of graphic designers managed by the consultants, the team developed a virtual prototype of a mobility hub in six months, which have been challenged twice in plenary sessions.

These ephemeral partnerships had several impacts for the community. First, they allowed deepening and testing the value of some concepts the community had nurtured. Second, they simulate new potential industrial ecosystems. And, moreover, they gave concrete outputs of the RI-Community visible to the outside, and especially to the networks of the members, and doing so, they stimulate new potential industrial ecosystems beyond the arena of the RI-Community.

4. Discussion

4.1 Impacts of the organization on ecosystem emulation for innovation

The RI-Community builds an original cross-industry and cross-discipline innovation capability that induces three main effects on industrial ecosystems.

Firstly, the community supported a collective better understanding of the role that members could play, individually, in subgroups, or as Community, in the emergence of sociotechnical shifts. Based on the organizational logics from "open innovation" described by (H. W. Chesbrough, 2003), the RI-Community was initiated on the common interest of the members to combine their knowledge, but they mostly differ to classic open innovation because the aim of the collective is not to look for potential innovation but to potential societal shifts. Indeed, as in classic open innovation, members share piecemeal knowledge that each has acquired in order to jointly build a larger and more robust map of knowledge. But, after that, they collectively discuss the different impacts they could operate together to disturb the contemporary societal paradigm of mobility, and what kind of effects their association could have on energy availability, urbanism, worldwide exchanges of people and goods, individual or collective mobility, etc. They adopted rigorous methods to support this exploration: each plenary session of the RI-Community starts with original knowledge sharing, followed by a collective debate and finally a systematical learning on disruptive concepts through thematic workshops.

Secondly, we observed that the organization induces an important emulation of sociotechnical imaginaries between members the community, bringing the interactions at a conceptual level, which disseminate beyond the group. The efficiency of the emulation results from an intensive learning on original knowledge, supported by collective debates on their interpretations. The case study also underlines the need for specific methods of collaboration,

as ‘boxing sitting’ exercise to enrich the debate, and rise to a conceptual level. Then, the variety and the nature of members in the community is the key point to maintain the debate at a conceptual level: as the membership is cross-industrial and cross-disciplinary, members must stay at a conceptual level to be understandable by the others. Intellectuals or academics help a lot to develop the conceptual capability of the group as they are particularly trained to conceptualize and put words on abstract concepts. In this way concepts and sociotechnical imaginaries became the main objects of the collaboration. Indeed, each member takes profit of the others’ vision of the same issue: differences and similarities are doubling underlined by cross-discipline argumentations and cross-industrial knowledge sharing. It generates a very emulative learning process when they share their knowledge and forecasts through references from theirs own imaginaries. The collaborative exploration allows gathering the sociotechnical references of each member and to create new one together: the sociotechnical imaginary of the community. Nevertheless, self-classification members operated of sub-groups within the community highlights that the people most trained to used imaginaries references and to put into words conceptual notions where the intellectual subgroup. Indeed, the involvement of intellectuals in the debates of plenary sessions strongly supports practitioners in the elicitation of sociotechnical imaginaries. But, it also induces formulation of industrials’ imaginaries when they tried to enrich their contributions or oppose them. If interviews underlined that the exercise is felt as perilous because practitioners usually had a poorer rhetoric, they also claimed that those who tried gained a better capability to disseminate in their firms the concepts mobilized in the RI-Community. However, for all members, the community supports an individual better understanding of potential sources of radical innovation. In return, it helps each actor to understand its own fixation effects on what the future “must” be: they could put into word their sociotechnical imaginary, and linked to this, the one of its industry. Doing that, members become able to describe their own fixation

effects in creative situations (Smith, Ward, & Finke, 1995), those of their firm and the core rigidities in term of the corporate values of it firm (Leonard-Barton, 1992) and could better disseminate his learning when he comes back inside the firm.

Finally, the initiative became an incubator for cross-industry partnerships that supports new industrial ecosystems emergence. The collective is made possible by the shared recognition of all these members of a situation of "*shared uncertainty*" and an ecosystem impact leading to "*complex and changing coordination*" of industrial and institutional actors (Aggeri & Hatchuel, 1998). Even if the most of underlying concepts are macroscopic sociotechnical imaginaries, it seemed that the workgroups were fruitful for all members to discuss contemporary challenges they need to overcome in shorter terms. When some similar issue emerged between a few members and if they could do it better together, exploratory partnerships also emerged. The study of long-term solutions in the community generated so many exchanges that the members learnt on the potential benefits of working together. As members meet regularly, trust develops between actors and negotiations start in merge of plenary sessions. The RI-Community has already led to several partnerships and joint ventures between members.

4.2 Implications for collaborative management of innovation

The case study highlights that objects of the collaboration when looking for new markets creation are different than expected by an open innovation approach and they are quite uncommon: concepts and associated sociotechnical imaginaries. The research shows that collective capabilities for innovation could be developed through an active emulation at this level, but it needs specific governance rules and management tools. In this case, the organizational construction becomes an incubator of new industrial ecosystem.

First of all, these three fields proposed tools and methods based on existing markets and in a stable environment. Beyond to anticipate the unknown from the known basis, due to original objects of collaboration, the paper highlights that the community adopts a new position.

This new positioning reveals another point of the distinction from classic collaboration based on business intelligence, technological forecasting and prospective. Indeed, the collective is no more focused on the potential evolutions of existing markets in stable industrial environment. At the opposite, the behavior of this RI-Community is rather based on a proactive attitude that used societal, environmental and technological trends as cognitive resources and no more as constraints, whose they are obliged to answer. This specific point of view raises the community capability for innovation to an ability of cross industrial and cross discipline action that supports the creation of an original industrial ecosystem and offers new visions of potential roles the companies could take in them.

Finally, to make it possible, tools and methods are necessarily different than those exposed in existing literature and need for a specific effort from innovation management practitioners and researchers. Through this case study, we contribute to a first understanding of new practices: we identify and qualify an original phenomenon of a cross industrial and cross discipline innovation-driven community, according two patterns, the objects of collaboration and organizational mechanisms of coordination. To increase our understanding, additional in-depth studies are needed to validate key reproducible elements and demonstrate their managerial implications.

5. Conclusion and further research

Strongly contingents to an industrial ecosystem, objects of the future modeling aiming to detect expectations do not support the emergence of a cross-industrial project, and conversely,

scenarios support a partitioning of actors, averse to the constitution of new ecosystems, and thus to new emerging markets. However, think of disruptive innovation in partnership requires a prior effort within the firm in order to express and make understandable concepts outside the organization (Felk, Le Masson, Weil, Cogez, & Hatchuel, 2011) and a conceptual absorption capacity, *i.e.* a capacity to meaning some concepts out of traditional design paths usually followed by the firm and stimulating business environment for their exploration (Le Masson, Cogez, Felk, & Weil, 2012). The case study presented here underlined that people could be trained and supported to become more efficient to conceptualize and give imaginaries references, thus opening the research issue of what could be a 'gatekeeper of sociotechnical imaginaries' for companies?

In this context, the activity of collective exploration of the future is no longer to "see" before other economic competitors or to build an immediate strategy but more to prepare new commercial spaces and propose objectives, enough generic to support the establishment of new rich imaginaries, both among potential users than designers. In the case of the Renault Innovation Community, we observed that the sociotechnical imaginary support an effective pre-positioning of knowledge of potential businesses in new ecosystems. Thus, surprising objects of coordination are observed, as concept demonstrators embodying proposals of shifts in societal trends. Voluntarily positioned in opposite of the conventional approach to reach detected expectations, these objects support involvement mechanisms between actors no longer based on knowledge exchanges for uncertainties reduction (traditional convergence objective on the known), but focused on the exchange of exploration tracks (original objective of partnering in the unknown). Beyond the work presented here, the communication modes mobilized by such actors are studied in an emerging literature (O Eris, 2003; O. Eris, 2004). Authors suggest differentiating the "generative design questions" that suggest ways of

exploration, from the "deep reasoning questions" that seek for clarifications on proposals considered as known. Further research will gain to enroll in the current field providing both empirical data and theoretical modeling of these objects, which are neither physical nor traditional projects.

References

Abernathy, W. J. & Utterback, J. M. (1978). Patterns of innovation in technology. *Technology review, 80*, 40-47.

Adner. (2006). Match your innovation strategy to your innovation ecosystem.

Adner, R. & Kapoor, R. (2010). Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations. *Strategic management journal, 31*, 306-333.

Adner, R. & Levinthal, D. A. (2004). What is not a real option: Considering boundaries for the application of real options to business strategy. *Academy of management review, 29*, 74-85.

Aggeri, F. & Hatchuel, A. (1998). Managing Creation and Learning of New Expertise in Automobile Development Projects. In *Projects as Arenas for Renewal and Learning Processes* (pp. 157-167): Springer.

Alavi, M. & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS quarterly*, 107-136.

Barnard, C. (1938). *The Functions of the Executive*: Cambridge: Harvard University.

Börjesson, S., Elmquist, M., & Hooge, S. (2014). The challenges of innovation capability building: Learning from longitudinal studies of innovation efforts at Renault and Volvo Cars. *Journal of Engineering and Technology Management, 31*, 120-140.

Brayton, T. (2013). *Identities Mediated, Worlds Calculated The Sociotechnical Imaginary of 'Precision Warfare'and Case Study Analysis.* Master Science-Technology-Society, Vienna University.

Castoriadis, C. (1987). *The Imaginary Institution of Society*. Cambridge: MIT Press.

Chesbrough, H. & Crowther, A. K. (2006). Beyond high tech: early adopters of open innovation in other industries. *R&D Management, 36*, 229-236.

Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*: Harvard Business Press.

Chimisso, C. (2001). *Gaston Bachelard: Critic of science and the imagination* (Vol. 9): Psychology Press.

Coates, J. F. (2000). Scenario planning. *Technological forecasting and social change, 65*, 115-123.

Cohen, W. M. & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 128-152.

Cohendet, P., Creplet, F., & Dupouet, O. (2001). Organisational innovation, communities of practice and epistemic communities: the case of Linux. In *Economics with Heterogeneous Interacting Agents* (pp. 303-326): Springer.

Cohendet, P. & Llerena, P. (2003). Routines and incentives: the role of communities in the firm. *Industrial and Corporate Change, 12*, 271-297.

Cowan, R., David, P. A., & Foray, D. (2000). The explicit economics of knowledge codification and tacitness. *Industrial and Corporate Change, 9*, 211-253.

Durand, G. (1993). The implication of the imaginary and societies. *Current Sociology, 41*, 17-32.

Durkheim, É. & Tönnies, F. (1889). Gemeinschaft und Gesellschaft. *Revue philosophique, 27*, 416-433.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review, 14*, 532-550.

Eisenhardt, K. M. & Graebner, M. E. (2007). Theory building from cases: opportunities and challenges. *Academy of management journal, 50*, 25-32.

Eris, O. (2003). Asking generative design questions: a fundamental cognitive mechanism in design thinking. In *International Conference on Engineering Design*: Stockholm.

Eris, O. (2004). *Effective inquiry for innovative engineering design* (Vol. 10): Springer.

Felk, Y., Le Masson, P., Weil, B., Cogez, P., & Hatchuel, A. (2011). DESIGNING PATENT PORTFOLIO FOR DISRUPTIVE INNOVATION–A NEW METHODOLOGY BASED ON CK THEORY. In *Proceedings of the 18th International Conference on Engineering Design (ICED11), Vol. 2* (pp. 214-225).

Felt, U. (2013). Keeping Technologies Out: Sociotechnical imaginaries and the formation of a national technopolitical identity. *Manuscript for the editied volume S. Jasanoff & S. Kim, Dreamscapes of modernity: sociotechnical imaginaries and the fabrication of power. Preprint available at http://sciencestudies. univie. ac. at/publikationen*.

Firnkorn, J. & Müller, M. (2012). Selling mobility instead of cars: new business strategies of automakers and the impact on private vehicle holding. *Business Strategy and the Environment, 21*, 264-280.

Flick, U. (2004). Triangulation in qualitative research. *A companion to qualitative research*, 178-183.

Fredberg, T. (2007). Real options for innovation management. *International Journal of Technology Management, 39*, 72-85.

Gawer, A. (2009). Platform dynamics and strategies: from products to services. In *Platforms, markets and innovation* (pp. 45-76): Edward Elgar, Cheltenham, UK and Northampton, MA.

Gillier, T., Hooge, S., & Piat, G. (2013). Framing the scope of value in exploratory projects: An expansive value management model. In *XXth International Product Development Management Conference* (Vol. Proceedings of IPDMC'13, pp. 21). June 23-25, Paris, France.

Godet, M. (2000). The art of scenarios and strategic planning: tools and pitfalls. *Technological forecasting and social change, 65*, 3-22.

Gordon, T. J., Glenn, J. C., & Jakil, A. (2005). Frontiers of futures research: what's next? *Technological forecasting and social change, 72*, 1064-1069.

Hargadon, A. & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly*, 716-749.

Hatchuel, A. & David, A. (2007). Collaborating for management research: from action research to intervention research in management. *Handbook of collaborative management research*, 143-162.

Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy, 35*, 715-728.
Iansiti, M. & Levien, R. (2004). Strategy as ecology. *Harvard business review, 82*, 68-81.
Jacobides, M. G., Knudsen, T., & Augier, M. (2006). Benefiting from innovation: Value creation, value appropriation and the role of industry architectures. *Research Policy, 35*, 1200-1221.
Jasanoff, S. & Kim, S.-H. (2009). Containing the atom: Sociotechnical imaginaries and nuclear power in the United States and South Korea. *Minerva, 47*, 119-146.
Kaplan, S. & Tripsas, M. (2008). Thinking about technology: Applying a cognitive lens to technical change. *Research Policy, 37*, 790-805.
Klerkx, L. & Leeuwis, C. (2009). Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technological forecasting and social change, 76*, 849-860.
Le Masson, P., Cogez, P., Felk, Y., & Weil, B. (2012). Revisiting absorptive capacity from a design perspective. *International Journal of Knowledge Management Studies, 5*, 10-44.
Le Masson, P., Weil, B., & Hatchuel, A. (2009). Platforms for the design of platforms: collaborating in the unknown. In A. Gawer (Ed.), *Platforms, markets and innovation* (pp. 273-305): Edward Elgar, Cheltenham, UK.
Le Masson, P., Weil, B., & Hatchuel, A. (2010). *Strategic management of innovation and design*: Cambridge University Press.
Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic management journal, 13*, 111-125.
Lichtenthaler, E. (2004). Technology intelligence processes in leading European and North American multinationals. *R&D Management, 34*, 121-135.
Midler, C. & Beaume, R. (2010). Project-based learning patterns for dominant design renewal: The case of Electric Vehicle. *International Journal of Project Management, 28*, 142-150.
Moore, J. F. (2006). Business ecosystems and the view from the firm. *Antitrust Bull., 51*, 31.
Nonaka, I. & Takeuchi, H. (1995). The Knowledge Creating. *New York*.
O'Connor, G. C. (2008). Major Innovation as a Dynamic Capability: A Systems Approach*. *Journal of Product Innovation Management, 25*, 313-330.
Pickersgill, M. (2011). Connecting neuroscience and law: Anticipatory discourse and the role of sociotechnical imaginaries. *New Genetics and Society, 30*, 27-40.
Radaelli, G., Guerci, M., Cirella, S., & Shani, A. B. R. (2012). Intervention Research as Management Research in Practice: Learning from a Case in the Fashion Design Industry. *British Journal of Management*.
Schnaars, S. P. (1987). How to develop and use scenarios. *Long Range Planning, 20*, 105-114.
Segrestin, B. (2005). Partnering to explore: The Renault–Nissan Alliance as a forerunner of new cooperative patterns. *Research Policy, 34*, 657-672.
Shani, A. B. & Coghlan, D. (2008). *Handbook of collaborative management research*: Sage Publications Thousand Oaks, CA.
Smith, S. M., Ward, T. B., & Finke, R. A. (1995). *The Creative Cognition Approach: Edited by Steven M. Smith, Thomas B. Ward, and Ronald A. Finke*: The MIT Press.
Strauss, C. (2006). The imaginary. *Anthropological theory, 6*, 322-344.
Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic management journal, 28*, 1319-1350.

Thrane, S., Blaabjerg, S., & Møller, R. H. (2010). Innovative path dependence: Making sense of product and service innovation in path dependent innovation processes. *Research Policy, 39*, 932-944.

Tij, S. (2012). *Exploring societal values associated with Electric Vehicle: Study of the absorption capacity of the Renault innovation community.* Master Thesis in Mobility and Electric Vehicle - Mines ParisTech.

van Lente, H. (2012). Navigating foresight in a sea of expectations: lessons from the sociology of expectations. *Technology Analysis & Strategic Management, 24*, 769-782.

van Lente, H., Hekkert, M., Smits, R., & van Waveren, B. (2003). Roles of systemic intermediaries in transition processes. *International journal of Innovation management, 7*, 247-279.

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5): Sage.